PLASTICS

A Periodical Devoted to the Manufacture and Use of Composition Products

DECEMBER, 1925

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Write for Booklet 51

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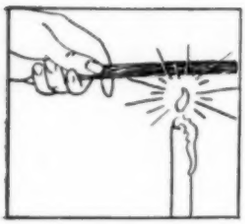

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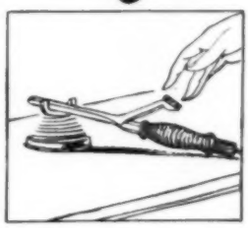

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4 ***Machines Perfectly***

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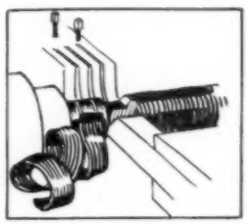

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Why not avail yourself of our experience and facilities rather than resort to individual makers of fractional parts of the equipment you need when we can supply them all?

EXPERIMENTAL DEPARTMENT

We have permanent equipment available for demonstration.

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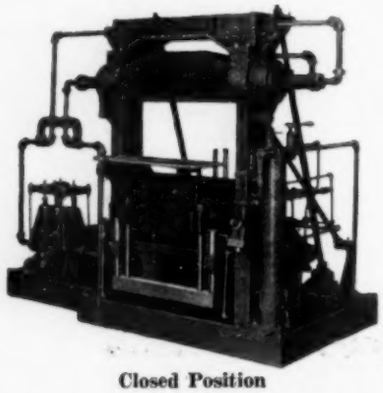

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Embodies the following features:

Direct heated and chilled mould.

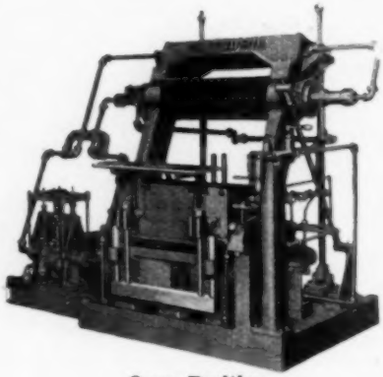
Automatic ejection of moulded pieces.

Centralized valve control.

Hydraulically operated steam and water distributing valve.

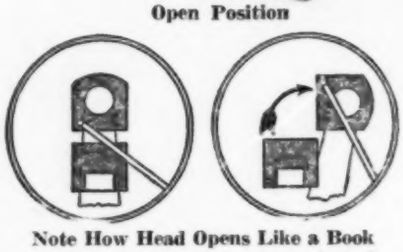
Head Tilts giving unobstructed view and access to upper and lower dies.

Short stroke due to Tilting feature low water consumption.

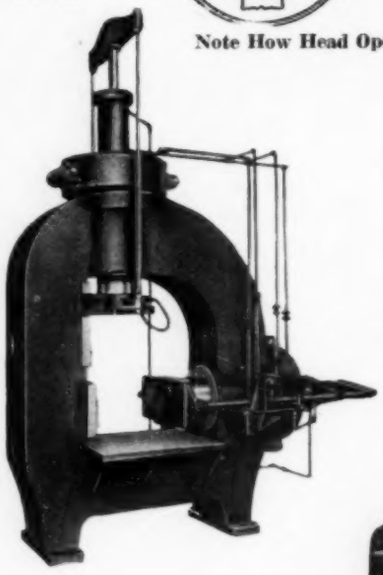


Open Position

We build this type of press in three standard sizes. Can build to suit your requirementts.



Note How Head Opens Like a Book



ANGLE MOULDING PRESS

(Patented)

Rodless Type for Production moulding with direct heated and chilled moulds for moulding pieces requiring split dies.

RODLESS HYDRAULIC PRESS FOR HAND MOULDS

Simple, compact, rigid construction, no rods to stretch or nuts to work loose, insures parallel surfaces between platens. Built in any size or power.

THE regulation publisher's column should contain an article on the vision of the industry and our idea of the place and future of a periodical such as *Plastics*. This time we are going to let a reader talk for us, and we are reproducing a letter from D. Loren Davis, Consulting Engineer, Plastics Division, W. A. Sheaffer Pen Company.

"It was indeed a pleasure to me to 'happen' on to a copy of *Plastics* of November issue. Being deeply interested in plastics and their fabrication, I am, of course, impressed with your publication. Enclosed find my check for three dollars ($3.00) for one year's subscription. Please send me the October issue that I may have a complete file of the periodical.

"Plastics have had an exceptional period of exploitation in the last few years, and indications are that its widest application still lies in the future. Due to present day demand of colorful novelties and articles, I can think of no material that will fill the need as well as plastics. While we think of plastics in connection with effeminate articles more or less, the large electrical field opened by radio and motor cars has demonstrated the practicability of plastics as a straight commercial product of extreme importance.

"Plastics have revolutionized the fountain pen business, and all who are using these materials are enjoying a rapid expansion.

"It has been my pleasure to conduct exhaustive experiments with both casein and pyroxylin plastics and to have had some experience with the phenol plastics. No doubt my experiments on the fabrication of plastics will be of interest to some of your readers, and I assure you I will be very glad to lend a hand in cooperation with your magazine for its advancement.

"Plastics magazine will no doubt be a volume of double its present size in a few months. It is a much needed addition to the industry."

The Publisher.

PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 1 **December, 1925** **No. 3**

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CLOTHES BRUSHES
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CIGAR HOLDERS
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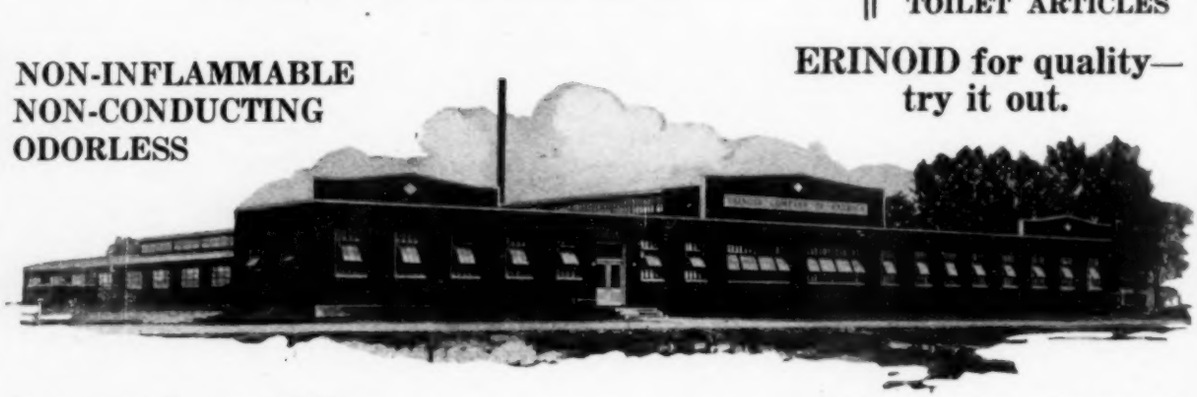

The new plant of the ERINOID COMPANY which has already begun production.

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PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 1 DECEMBER, 1925 No. 3

Pyroxylin--A Poor Name for a Good Product

A shorter and more easily remembered name is sorely needed to convey the idea of this universally applicable material to the public

By Carl Marx

Modern methods of efficiency demand short and terse terms in describing materials.

The circumlocution which has been necessary in the past in describing one of the most widely used plastic materials has led the writer to propose to the industry at large the adoption of some characteristic name to replace the cumbersome term "pyroxylin plastic material". Open discussion is invited on the part of our readers.

YEARS ago, when the pyroxylin plastic industry was still in its swaddling clothes, the pleasant pastime of giving the new product a name began to engage the attention of the inventors and improvers. Since that day name upon name was coined, used perhaps for a while, and then passed on into the limbo of forgotten things.

A few of the more thorough bibliographers of the generic art of pyroxylin plastics have compiled lists of the diverse and often jaw-breaking names given to some of these products, forming, as it were, a sort of mausoleum in which they may lie enshrined for the reverential (more or less) perusal of the students in the years to come.

It is, however, a peculiar fact that no one single name, at least with English speaking peoples, has been universally adopted for the pyroxylin plastics in general.

Now "Celluloid," for example, comes about as close as any one of the names ever proposed to have found universal adoption, and it is problematical if there is still anyone who fails to understand just what is meant by this name. But, and here lies the difficulty, the word "Celluloid" is the registered trademark of an individual corporation, and is carefully guarded by the same, lest it be adopted by the trade in general, and lose its identity.

This is, of course, perfectly justified and proper. Other names, more or less suggestive of the origin of the material, namely cellulose or pyroxylin, are "Pyralin", "Fiberloid" and the like. But, again, each one is a trade-mark and not a generic term.

"Pyroxylin," while at present generally understood in the trade to mean the plastic product resulting from the admixture of some plasticizer, usually camphor, with cellulose nitrate is in reality the correct and proper name for only the cellulose nitrate itself, and then only when a low-nitrogen cellulose nitrate, such as of about 11.7% N, is meant. The name was given to the product almost three generations ago.

The general name "Collodion cotton" is, or at least was for many years, synonymous with "Pyroxylin," but found application mainly in the photographic industry, where at one time, "Collodion emulsions" were the main-spring of this entrancing art.

It is about time that a generic, easily pronounced and "free-for-all" name should be adopted for the many "Pyroxylin Plastics" that are fulfilling such a useful mission in the field of applied arts.

The artificial silk industry, with its keen competition between the various synthetic filaments, such as "Viscose," "Cuprammonium," "Chardonnet", "Cellanese" and the like, found a salvation in the coined word "RAYON". At one stroke this did away with the highly undesirable term, "artificial silk," which, to the public mind at

(*Continued on page 105*)

New Hydraulic Press Electrically Heated

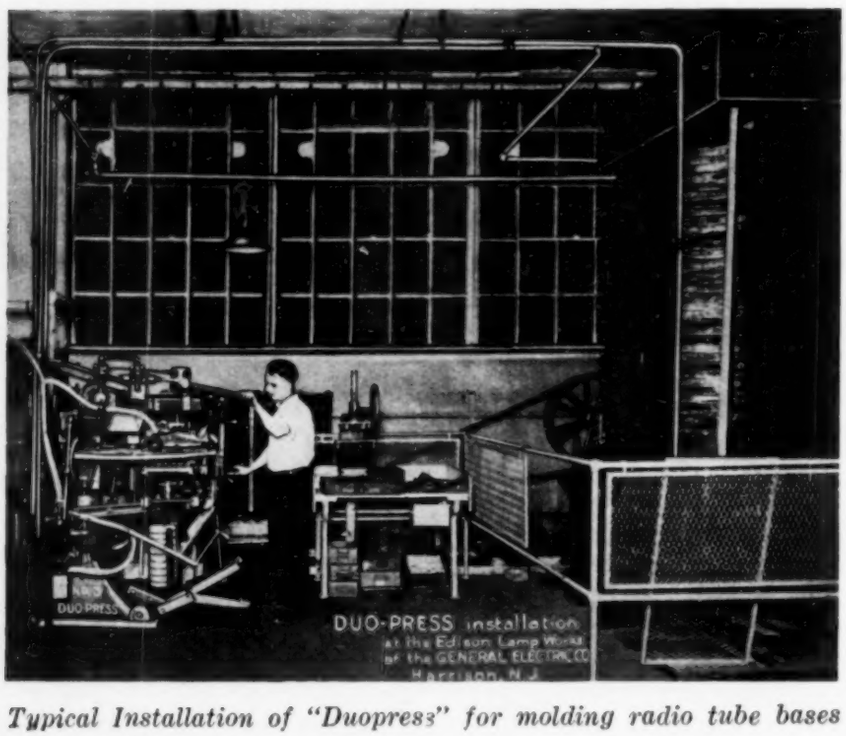
Mass production of molded parts demands machinery that is almost human in its action

By Paul R. Ketzer
A. B. Farquhar Co., Ltd., York, Pa.

FOR several years I have watched the development of hydraulic molding presses, and within the last nine months I have gone through about seventy-five percent of the molding plants in this country, covering the largest as well as the smallest molding shops.

I can truthfully say the hydraulic molding press has been about the same year in and year out, just a plain hydraulic press with hot plates heated by steam, and cold water running through the steam plates for chilling the work which is necessary in many cases for curing.

Then in some cases the heavy molds are lifted out by hand to another press where the plates are kept cooled all the time by running cold water through them, when the chilling would be done on this press, thereby leaving the steam in the plates on the first press. This of course, employs the use of two hydraulic presses. With either method, the molds are again lifted to a third press which usually is a geared arbor press. In this press the finished work is ejected from the molds. With the above mentioned methods, it has been found that it is too slow for production, although it is necessary to use this method on Bakelite work. Where they use one press for heating and cooling, it makes necessary to run the cold water through the hot plates and then running steam through these same plates to get them hot again, which is a loss of time, yet added to this they have to go to the arbor press in order to eject the work from the molds.

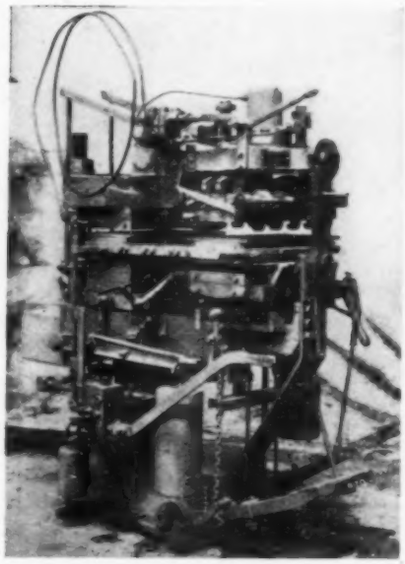


Typical Installation of "Duopress" for molding radio tube bases

Then, again, from an engineering point of view, as well as a practical point, it is all wrong, to run steam and then cold water through the same plates. First, because it takes too much time to raise the temperature from a low to a high temperature, and then to cool from a high temperature to a low temperature. And it is also injurious to the plates, as the action is one of a constant expansion and contraction, making an accordion out of the plate, which in time and in some cases, has ruined the plates, especially if they are made of cast iron. Since steel plates have been employed for this work in a number of the shops, some of this trouble has been eliminated, but not the delay in waiting to change the temperatures from one to the other. It is also necessary with the above described methods of plastic molding to employ husky and strong men to handle the molds from one press to another.

Now, about nine months ago, my attention was called to a press which is shown above called the "Duo-Press." And really, it should be called a "Trio-Press," as it embodies the methods covering the three presses described in the fore-part of this article, instead of two presses which the word "Duo" covers. This press is now being built by the A. B. Farquhar Co. Ltd. under contact with the inventor.

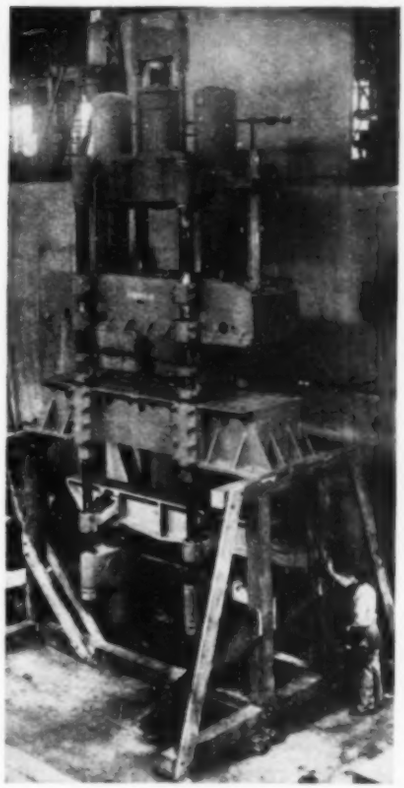
It was first developed to make Graphophone records, but as Radio became important the inventor quickly made some minor changes and made, what to my mind is a perfect molding press, that lends itself to the manufacturing of plastic parts used



This press combines the work of the hot, chilling, and arbor presses.

in the completion of radio, electrical, telegraph, telephone, automobile, aeroplane, motor-boat parts, celluloid, rubber, buttons, and in fact, any article made of material where heat is employed to finish the same Now, to add to all this, I found a suitable electrically heated hot-plate that has been very satisfactory by large users, that fits in very nicely on this press, and this hot plate can be operated cheaper by electricity than it costs to operate the same sized plate by 150 lbs. of steam pressure. Moreover, the electrically heated hotplate is equipped with a thermostatic control that will give a uniform temperature automatically at all times. The reason this plate fits in so conveniently on the Duo-Press, is, that the hot plate has a separate station and the cooling plate also has a separate station, but on the old type of hydraulic press, where electric hot plates are employed it will be necessary to take the molds out and place them in another press for cooling, and then to the press for ejecting.

Now, all the above as to handling the molds, is done on the Duo-Press, automatically, and the operator stands in one place at all times, never having to touch the molds, as the molds are handled by means of a revolving carrier table, or in other words, the hot plates are in the rear of the press where the curing is done, and the cooling



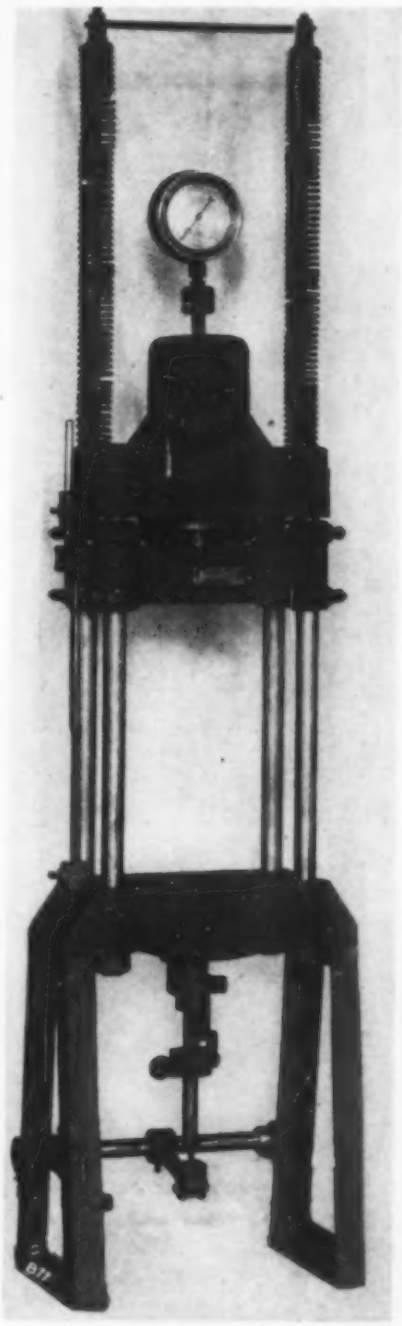
The huge size of the modern hydraulic press as contrasted with the human figure.

plates are in front of the press, which makes the operation as follows: the placing of the raw material in the molds and the ejecting of the finished article is done in the front part of the press. All this is done while the curing and the heavy pressing is done in the rear of the press.

One of the No. 3 Presses has been installed and the writer personally has seen it in operation, in one of the largest electrical manufacturing companies in this country, where a test run for speed and accurate work on Bakelite was made. The piece that was made was called a "201-A" Radio Tube base. They made 174 heats in eight (8) actual working hours, including molding the four contact points in each piece, and no rejects were found during this test on account of the press not functioning properly. I was told by the parties who conducted this test that 22 heats can be made per hour and the molds will take from 50 to 60 cavities covering the dimensions of the above described piece, as to diameter. This test was made June 19, 1925, much to the manufacturer's surprise and satisfaction.

To give the reader an idea as to why this press is far superior to any other, especially the old types, and is a good machine for

(Continued on page 102)



Popular Type of inverted hydraulic press.

Precautions in Handling Pyroxylin Materials

New York State Department of Labor Suggests practical means for minimizing fire hazards

By John H. Vogt

CELLULOID, an article of commerce used for varied purposes and quite extensively worked in a number of factories in New York State, is a mixture of the lower nitrated products of cellulose with another substance, usually camphor.

The gases generated when this product is decomposed (estimated to begin at 275 deg. F.) are easily ignited by heat which may be generated through friction in working the material.

As various types of machines used to cut, shape and polish celluloid disengage quantities of chips, turnings and dust in amounts that necessitate removal by means of exhaust systems, certain precautions are necessary in order to prevent ignition when in a state of division and to insure safety to workers enengaged in cutting, shaping, turning, buffing and polishing the celluloid objects.

Decomposition of celluloid, caused by heat when working it, is readily arrested by the use of water; the reason is that it lowers the temperature of the mass by its application, and blankets a burning body thereby excluding the oxygen of the air. The liberal use of a stream of water against the cutting parts of saws, shapers, lathes, is recommended.

These machines may be fitted with receptacles into which the celluloid refuse may fall and be submerged in water until removed.

Grinding, polishing and buffing wheels, excepting wet sand wheels should be provided with exhaust system, constructed according to the New York State Industrial Code Rules for the speedy removal of the dust disengaged from them.

Incandescent dust thrown from grinding wheels should not be allowed to enter the exhaust system for celluloid dust.

Trunk line pipes of the exhaust system of grinding wheels for celluloid material should be constructed to contain a sprinkler system, with heads eight feet apart. The collector should be provided with several sprinkler heads. The dust receptacle box should be constructed to provide for complete submergence in water of all collected colluloid refuse. With large installations, a water flushing system for spraying water in the pipes is advantageous, for use when a fire would not operate the sprinkler system. All piping should be smooth on the interior and it is preferable to have the main pipe elevated rather than placed along the floor. Elevation lessens the chance of large articles accumulating in it which would not be carried along with the air current.

Fans for moving the air in the exhaust system should have copper or bronze blades, and be indirectly driven.

(*Continued on page 102*)

Artistic Effects Possible by New Method of Using Plastic Sheets

FOR many years all articles coated with pyroxylin materials were finished with a smooth and seamless coating, the main endeavor being to provide a faultless and uniform resulting object.

In contradistinction to this tendency, some recent innovations depart considerably from this idea and provide a new method that allows of some very artistic effects.

The principal of the new method is in the use of softened pliable sheets of plastic material, such as cellulose nitrate, pyroxylin plastics or other cellulose derivatives. The sheets are rendered soft and flabby by immersion in solvents, following which they are wrapped around a suitable core so that folds and pleats are produced. After drying the articles can be handled and are stiff and rigid. By using glass, Plaster of Paris, clay, porcelain or papier-mache vases and the like as a base, these can thus be surrounded by a rough, pleated and hand-formed decorative coating, providing great latitude for the ingenuity of the designer.

Thin pyroxylin plastic sheets of a thickness of about 0.15 to 0.40 millimeters are used, being softened in the following:

Acetone, 60 percent.
Methyl acetone, 30 percent.
Benzol, 5 percent.
Amyl acetate, 5 percent.

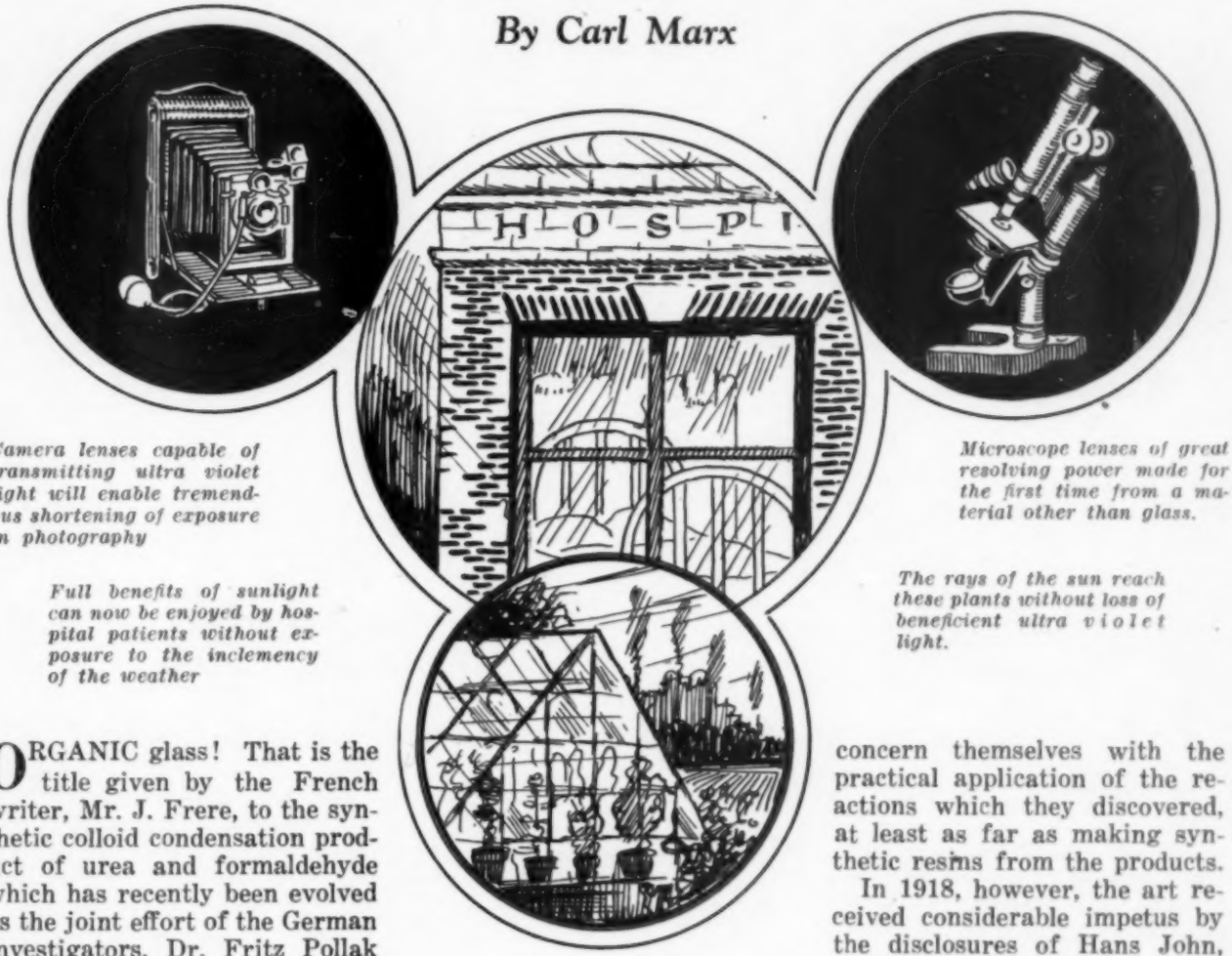
The process can be applied to the covering of umbrella handles, automobile steering wheels, and similar objects where a roughened surface is desirable. For the preparation of artificial flowers and millinery trimmings, the process appears to be fitted admirably. It is covered by the German Patent of Erich Linden, of Berlin, Germany, No. 397919, applied for February 24th, 1923.

From Gummi-Zeitung, 1925, No. 22, p. 747.

Pollopas---Organic Glass Substitute

Perfectly transparent condensation product of urea and formaldehyde can now be prepared

By Carl Marx



Camera lenses capable of transmitting ultra violet light will enable tremendous shortening of exposure in photography

Microscope lenses of great resolving power made for the first time from a material other than glass.

Full benefits of sunlight can now be enjoyed by hospital patients without exposure to the inclemency of the weather

The rays of the sun reach these plants without loss of beneficient ultra violet light.

ORGANIC glass! That is the title given by the French writer, Mr. J. Frere, to the synthetic colloid condensation product of urea and formaldehyde which has recently been evolved as the joint effort of the German investigators, Dr. Fritz Pollak and Dr. Kurt Ripper. The latter have given the new material the name of POLLOPAS, which they explain is derived from the name of the first, namely POLL (ak) plus the letters o. p and a, which are taken from the names of various precious stones which it was found to be possible to closely simulate by this material, namely opal, topaz and chrysoprase. The name has been given trade-mark protection, and will probably become as well known for this new class of condensation products as some of the better known phenol resin products of our own country.

The fact that this newest member of the synthetic resin family is water-white and completely transparent will without doubt contribute considerably to its popularity and will permit of its use in many instances where the darker color and lack of complete transparency will prevent the employment of the older type of condensation products.

Now it is not claimed that either Drs. Pollak or Ripper were the first ones to produce any urea and formaldehyde condensation products; in fact that art dates back to the last decade of the previous century, when various chemists were able to produce condensation products of these two substances. But, and this is the important point, they were only looking for chemical results, and did not concern themselves with the practical application of the reactions which they discovered, at least as far as making synthetic resins from the products.

In 1918, however, the art received considerable impetus by the disclosures of Hans John, who patented a process of producing water-white urea-formaldehyde condensation products by allowing formalydehyde and urea to react without the use of catalysts. (See U. S. Pat. 1,355,834). According to his patent. John employs 5 to 6 parts of 40 percent formaldehyde to one part of urea, evaporating the material to a syrupy consistency. The solution thus obtained is allowed to cool when it will gelatinize. The gelatinized mass is then heated to 80 degrees C. which causes its transformation into the solid form, insoluble in water and alcohol, and from which the desired objects are then made.

John's method does not, however, yield the ideal type of

product, as an excess of formaldehyde is present and the material hence has a strong odor of this rather unpleasant substance. John sold his patent to Hans Goldschmidt, of Thermite fame, and the latter, together with Oscar Neuss did some further work on the subject.

This brings us to the work of Pollak and Ripper, who, recognizing the defects in the processes of the earlier workers, investigated the subject from a new angle.

It was soon found that when working along the lines laid down by H. John and using an excess of formaldehyde, that considerable difficulties would be encountered. John worked without condensing agents, and his product proved to be essentially a solid solution, and it became evident that to form practicable products that the excess component must be removed. As the removal of the formaldehyde required considerable heat, the escaping gases caused pockets and bubbles in the material so that, for all intents and purposes, it was valueless.

A reduction in the amount of formalydehyde did not lead to the desired results, as then the condensation leads along quite different lines. When using less formaldehyde the products become turbid, and although they can be cleared up by heating, they then warp and crack.

Using Alkalies

Work was then begun on condensing agents or catalysts, and it was discovered that much superior results could be obtained by the use of alkalies. At first it was found that a mucilagenous solution would form, that could be satisfactorily hardened, but only very small pieces could be made, and these were not plastic and could not be manufactured into objects except by cutting.

The researches then took on the aspects of intricate colloid chemistry, which, although intensely interesting to the chemist versed in this difficult subject, are much too involved for profitable discussion in other than purely scientific journals. Suffice it to say that it was found possible to cause the condensation of urea and formaldehyde to take place in an alkaline medium, and to further allow the material to form in solutions which were just about neutral, that is to say, were neither acid nor alkaline. The presence of certain inorganic salts also helped to keep the products from becoming turbid and translucent, so that finally it was found possible to produce relatively large pieces of pure water white and perfectly transparent material, which, in all its physical aspects, very closely resembles glass, but has the great advantage of not being so brittle or easily broken.

This description of Pollopas is based upon the disclosures of Dr. Fritz Pollak and Dr. Kurt Ripper, the inventors, in articles appearing in the Chemiker Zeitung, Revue des Produits Chimiques and Chemical Age (N. Y.) It is a resume of the essential information regarding this interesting material.

The difficulties encountered when the forming of large pieces of Pollopas is attempted were very great. As the material has to be placed in the forms while still in a more or less liquid state, the removal of the solvent caused considerable trouble. The problem was finally solved in an ingenious manner.

Molds were prepared whose walls, while permeable to the fluids which separated from the material, would prove impermeable to the condensation product itself. As the ultimate size of the particles of the colloid itself varied from 1 to 100 double mu, the molds were made by coating porous materials with substances capable of forming permeable membranes. This method of molding was considered to be such an innovation, that patent protection for the same was sought.

The most typcial property of Pollopas is its complete transparency and lack of color, and its capacity for being highly polished. Prof. Haschek has examined the material optically and finds that Pollopas is suited for the transmission of ultraviolet light rays, which are, as is well known, absorbed by glass; and hence Pollopas is applicable for many uses when glass could not be employed.

Desirable Physical Properties

While Pollopas is not a complete substitute for flint glass it was found possible to vary its index of refraction from 1.54 to 1.9. This property makes the new material eminently suitable for the construction of fine camera and microscope lenses, as its relative softness allows of easy and accurate forming and polishing. When covered with a suitable protecting layer to prevent scratching, it should prove very useful for this purpose.

The hardness of Pollopas is about 2.95 on the Mohs scale, that is that material is slightly softer than calcite, which is third on this scale. As compared with the phenol resins, these average about 2.9, so are very close to Pollopas in hardness. Galalith, a casein plastic material, has a hardness of 2.8, and natural mother-of-pearl about 3.1. From this it becomes evident that Pollopas can be readily worked on a lathe, and has other desirable mechanical properties. The specific gravity of Pollopas is 1.44, or about one-half of that of glass, and compares favorably with such materials as ivory, 1.7 to 1.9; quartz 2.05, porcelain 2.24 to 2.49, and glass 2.5 to 3.9. The physical properties of Pollopas, such as the breaking strength, elasticity, and the like were found to be superior to that of the greater number of the synthetic resins. The thermal conductivity, by which is meant the number of calories or heat-units transmitted through a plate 1

(Continued on page 103)

"Bandelles" — the wide bands— serve to identify each bird by number. The "Spiralets" come in various sizes and in many colors. They are used to mark the different ages, breeds, or pens.

Keeping Tab on Chickens

Pyralin leg-bands act as card index system for the poultry owner

By S. T. Byrne

ONE may paraphrase the title of Ellis Parker Butler's famous book and say "Chickens is Chickens," but any up-to-date poultry producer will soon point out the error of the statement. For he knows that in a flock of chickens there is a great difference in their individual value. Some, from all appearances, may seem to be the pick of the flock, but from an egg-laying standpoint they are left far in the rear by others who are not good looking, but are nevertheless money-makers.

The poultry owner has found that in order to secure maximum efficiency, he must keep accurate records and cull from the flock those whose productivity is below standard. This enables him to operate on a much more profitable basis than when poor producers are kept with good ones, which happens on many a farm where no scientific methods are used.

Separate pens for sub-divisions of the flock, or for different species, a regulated diet, trapnests, and most important, the use of leg-bands to individualize each fowl—all these are steps toward efficiency.

The proper use of leg-bands will enable the poultry owner to determine a number of important points. With varicolored and numbered bands, he can tell in what pen a bird belongs, how old it is, and whether it is a good layer; in fact, these bands can be as useful as a card index system would be.

The above bands are made of a pyroxylin plastic material. They are extremely light in weight and are easy to attach. They are made in sizes small enough for a baby chick to wear and upward to a size large enough for a turkey gobbler. These "Spiralets"—they are made in a great variety of colors—are used to designate the age of a fowl or the pen in which it belongs; they do not carry identifiying numbers.

The inspiration for these pyralin Spiralets is probably the leaden leg-band once worn by carrier pigeons. Attached to the band was a metal disc, bearing the name or number of the feathered messenger.

Circlets of lead, heavy, clumsy, dull, and Spiralets of varicolored featherweight pyroxylin —what a contrast!

From The Dupont Magazine for September, 1925.

Opportunities in the Chilean Market Neglected by American Exporters

CHILE is an excellent market for Pyroxylin Plastic articles as no factories producing this material are in existence in that country. According to recent advices most of the larger stores in Chile have a good stock of pyroxylin wares. Even the smaller towns present a market especially for the lower priced goods. The latest official statistics are those covering the year 1923. This gives a fair idea of the type of material imported into Chile and the value thereof.

Importations in 1923

Cigarette holders and pipe stems of pyroxylin plastic materials —9 Kilograms, value 4.28 gold pesos.

Pyroxylin sheet, 3330 Kilograms, value 14538 gold pesos.

Toys made of pyroxylin or rubber, 2361 Kilograms, value 135,160 gold pesos.

Other pyroxylin articles, 26,861 Kilograms, value 321,549 gold pesos.

About one half of these goods were imported from Germany, France furnishing almost as much, with Japan and England supplying practically all the rest. The United States apparently has not as yet tried to get its share of this market.

The terms upon this material is sold to Chilean importers are 90-day sight draft against documents on arrival. Especial care must be taken in packing as the landing conditions on the western coast of South America are difficult and breakage is quite common.

The documents which accompany the imported goods are:

Bill of lading in triplicate, Consular bill of sale in duplicate, and a duplicate of the insurance policy. In charging or computing the amount to be collected against the documents, all transportation charges, freight, commissions, interest, etc., should be included, so that the sight-draft can be made out at once for the correct amount, thus avoiding all controversies later

Health Hazards in Brush Making

The insidious danger of benzol poisoning is grossly underestimated by the uninitiated

By A. C. Tate

IT may interest the manufacturers of brushes which make use of plastic materials to know that the New York Department of Labor has published several little bulletins on Industrial Hygiene, under the auspices of Mr. Bernard L. Shientag, Industrial Commissioner.

The first one deals with the effects of wood alcohol (methanol or methyl alcohol) and its derivatives on the workers coming in contact with. This is Bulletin No. 3. According to this bulletin wood alcohol is encountered in the manufacture of celluloid buttons and toys and the like. Wood alcohol and its derivatives enter the system by inhalation and the symptoms of poisoning by this agent are irritation of the eyes, throat and lungs, vomiting, swimming of the head, shortness of breath, blindness and even death by stoppage of the heart. Wood alcohol also produces an eruption of the skin of the hands and arms.

Prevention is the best remedy. Ventilation is the only preventive where wood alcohol is used. When ventilation is impracticable, wood alcohol and its derivatives should not be used as a solvent.

Bulletin No. 6 of this series deals with Benzol, properly called benzene. This is a coal tar product and quite distinct from petroleum benzine. It is absorbed into the body chiefly through the lungs and as a vapor is very irritating to the throat.

The symptoms are headache, swimming in the head, loss of breath, rapid pulse, heart affections and purple color of skin, rash on skin and delirium. In chronic poisoning there is sleeplessness, swimming in the head, ringing in the ears, vomiting, numbness and skin eruptions.

For the protection of employees wherever benzol is used ventilating devices must be maintained at the point of origin, such as hood connected with proper air exhaust systems. Tanks, receivers, etc. in which benzol has been kept should never be entered for purposes of cleaning and repairing until after a preliminary thorough removal of all residue and thorough ventilation.

Workers should wear gloves when handling this material and proper facilities should be furnished for bathing.

While not encountered in the celluloid industry as much as some other solvents, it nevertheless enters into the composition of many plastic materials. Its danger is frequently grossly underated. It may also be pointed out that benzol (Benzene) is frequently the cause of pernicious anemia.

Tunable Radio Loop Has Bakelite Frame; Patent Applied For

A tunable Radio Loop Antenna, called "Tun-a-loop" was shown at the recent Radio Show by the English-Whitman Products, Inc. The loop consists of two sections which are rotatable parallel to each other. The wire is stretched over a molded Bakelite frame. In order to attract attention, this firm had several of these loops made up of colored transparent Bakelite, furnished with gilded or other colored wire, which, housed in a special stage-like display stand with flood lighting, presented a very striking appearance. The new loop is protected by patent applications. It is interesting to notice how the various manufacturers of radio parts take pains to acquaint their buyers with the fact that their apparatus is made from some particular material. The synthetic phenol-resins appear to be more popular than ever.

B. F. Goodrich Rubber Co. Exhibits at Radio Show

The B. F. Goodrich Co. took advantage of the Radio Show to acquaint the public with the virtues of their hard rubber radio panels, which they claim to be the equal of any resin panel made. They are putting out a special hard rubber for panel use, which they call Radio Sheet, the softening point of which is 25 degrees Fahrenheit higher than that of ordinary hard rubber, and which machines very easily. It comes in both black and mahogany finishes. Variometer mounting also attracted some interest.

Beginning in January
"With the Pioneers"
A series of articles on the builders of the plastic industry

London House Sets Up Plant for Handling Plastic Materials

A new plant capable of dealing with fifty thousand tons of Plastic materials per year has recently been completed for the Alfred Harris & Co., Ltd. at 143 Narrow Street, Limehouse, London, E 14.

The line of materials which will comprise the bulk of the trade will consist of waste wax, waste pyroxylin, waste ebonite and waste rubber. The plant is located stragetically in the proximity to all docks so that rapid and economical handling of the large volume of materials is assured. At the present time the plant employs seventy-five workers.

Novel Method of Decorating Pyroxylin

Playing cards made by this distinctive process present a pleasing appearance

By A. C. Tate

PRINTING upon plastic materials presents unusual difficulties, especially in the case of pyroxylin base materials as the ordinary inks do not dry properly and fail to cling to the smooth surface of the product.

To transfer printed matter by means of mutual solvents for the inks and pyroxylin, also becomes impossible due to the insolubility of printing ink in ether and alcohol which are used as the usual pyroxylin solvent.

The decoration of pyroxylin plastic materials has been solved in a rather ingenious manner by Phillips Guilleume Glaser, of Marseille, France, by the application of proper transfer-sheets. The process consists of first printing the design, which may be in as many colors as may be desired, upon a transfer paper, followed by uniting the impression with the pyroxylin sheets by the use of solvents of pyroxylin, coupled with the use of pressure.

After the transfer has taken place, the imprint is covered with a thin sheet of plastic material, and the two sheets are united by solvent and pressing. Any ordinary printing ink and metallic bronze poyders may be employed for the purpose. The operations are as follows:

Paper coated with a release material is printing with the design or lettering. The sheet thus prepared is transferred to the plastic sheet by using a solvent and going over the two sheets with a roller, while the same are supported upon a rigid and smooth surface, or which, if relief or intaglio is desired, may be suitably engraved, and may consist of glass, copper, zinc, bronze, aluminum or the like. Due to the pressure, the colors and printed matter actually enter the surface of the plastic material so that the outlines remain sharp and clear.

The release material allows the paper to be withdrawn without wetting, in fact it can be lifted off quite readily from the impression. Specific examples of the application of this process are the manufacture of playing cards of pyroxylin plastics and the fabrication of decorative novelties.

Playing cards are made as follows: A red sheet of pyroxylin plastic material is placed upon a glass plate, which has had engraved upon it, by sand-blasting or an etching process, the design which is to appear upon the back of the playing card. A second sheet, say of blue material, is placed upon the red sheet after both have been moistened with

(*Continued on page 105*)

Measuring Molding Powder

By L. H. Bailey

F. T. Stokes Machinery Company

THE measurement of molding powders, such as Bakelite and Condensite, preparatory to placing them in the hot molds has always been a troublesome problem. Hand weighing is either slow or inaccurate, accuracy being attained only at a sacrifice of speed.

Measuring Machine in Action.

One solution of the problem was to perform the material into "biscuits", on an automatic compressing machine. This method is very good for some grades of material and for the simpler forms of molds, but is not so satisfactory for complicated molds, especially those containing metal inserts.

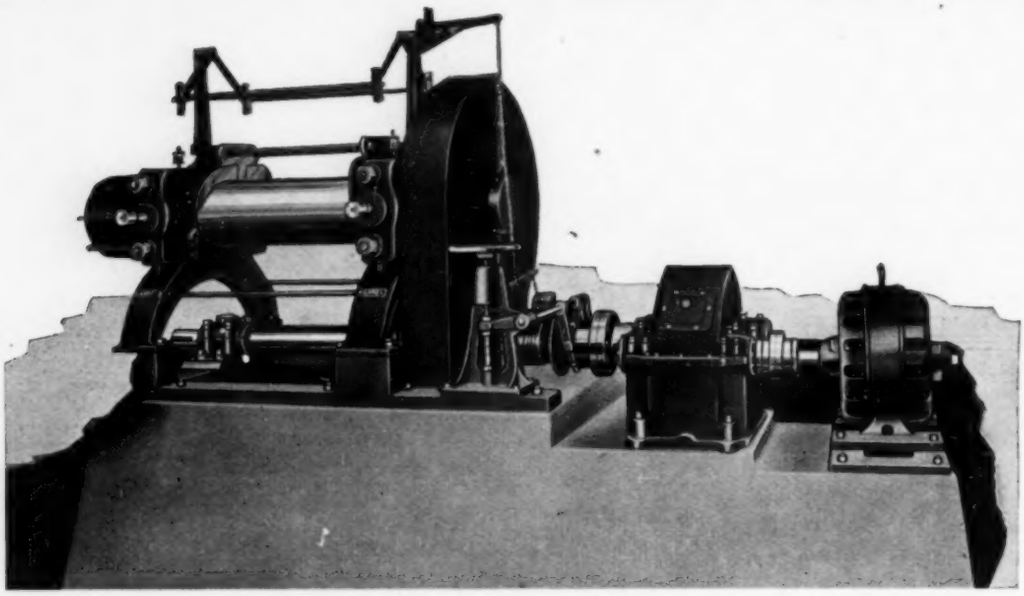
The machine illustrated herewith eliminates the preforming operation and the inefficient hand weighing, and will operate on any grade of material. The powder is measured in a steel die and delivered to containers from which it can be poured into the hold molds. About 35 charges per minute can be measured and the accuracy is very good. A series of tests showed a variation of less than one percent on charges of two to three ounces, which is sufficiently accurate for the "positive" types of molds.

The machine will measure any weight of charge up to three ounces. Adjustments of weight amounting to one-half to three-quarters of an ounce can be made by a small hand-wheel on the machine. Larger changes in weight are taken care of by removing the measuring die and inserting another which is bored out to a different diameter.

The operator merely has to place the empty containers on the conveyor and remove the filled ones which are automatically pushed from the conveyor to the table.

FARREL

REG U S PAT OFF



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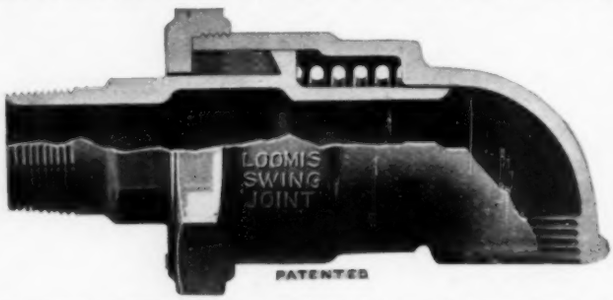

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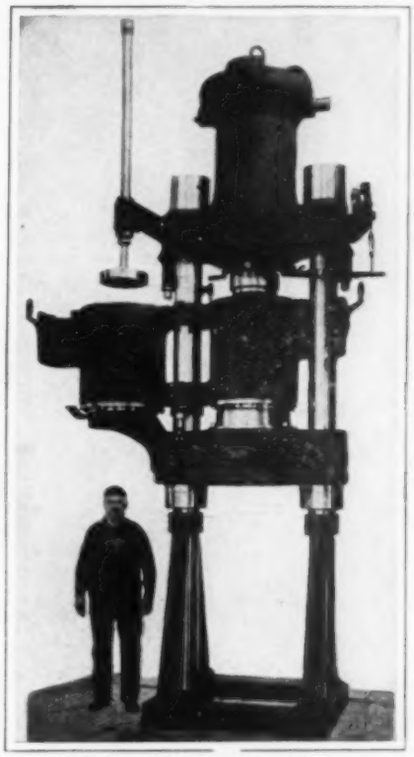

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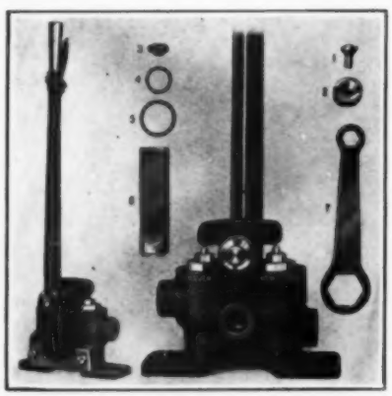

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EDITORIAL · IMPRESSIONS

Educating the Ultimate Consumer

THE forthcoming Yule tide presents yearly a great opportunity for the fabricators of things beautiful and useful to find a ready market for their products as gifts. Of course, the so-called "Holiday Trade" actually begins many months before the actual retail selling campaigns of the department stores and the other outlets.

Nevertheless it appears as though some opportunities for the sale of Plastic material are being neglected, and in so many instances the entire burden of advertising is left to the ultimate seller of the wares.

Often they are sold under names that do by no means reflect the true character of the material. Take the term "French Ivory," for example. It is doubtful if the average buyer of this class of material is actually aware that he is getting something that is about as near to real ivory in properties as New Jersey is to the jungle home of the African elephant. This is another case of what might almost be called misbranding, but it has the sanction of long-continued use (or abuse).

It is our belief that such materials should be offered by the retailer under at least their real trade name, or some inkling given to the purchaser as to the nature of the material.

The purveyors of the raw materials can do no better service to the fabricators and retailers than by letting the buying public in general know about their products; which, in the last analysis in every case are not only superior to the "ivory" they imitate, but will in most instances outlast it under the same conditions of service.

Standardization

ONE ailment that the pyroxylin plastic industry is suffering from is one that should be easy of cure if the proper cooperation of the men in the trade can be secured. It is the all-important question of standardization of weight and thickness of material.

No one can intelligently calculate costs and submit honest estimates to a prospective purchaser when he is obsessed by the often justified fear that some competitor, perhaps not quite as scrupulous as himself, will give a lower figure, but base this figure on a lighter weight or size stock, without so indicating that fact in his estimate.

Some time ago the Pyroxylin Fabricators Association took up this matter—and it was high time. Now if the individual members of that organization will only live up to the standards tentatively set by the committee appointed for this purpose, we may look a little more confidently into the future.

For nothing is more certain than that an industry, in order to be properly prosperous, must be founded on good faith and performance as between buyer and seller.

Casein Progresses

ANY one who has followed the trend taken by the fabricators of novelties cannot have failed to notice the remarkable advance made in the manufacture of plastic materials from casein. A few years ago the casein plastics were represented by only one internationaly known material, Galalith; while today there are at least six well known and highly perfected casein products on the world's markets.

PLASTICS

While much remains to be done, and a truly thermoplastic casein product still awaits discovery, the variety and beauty of the modern prdoucts is a revelation to any one who has not followed the development closely during the post-war period.

There is no doubt but what this material will be an active competitor for the other light-colored, non-resin, plastic materials; especially when combustibility is a factor.

Export Competition

AMERICAN manufacturers are missing a bet; witness the following:

Japanese manufacturers are securing a very large share of the Peruvian trade on toilet articles, such as hair and tooth brushes, hand mirrors, ladies' dress combs, etc.

This situation has been particularly evident since the establishment during the last two years of new Japanese shops in the city of Lima, in which toilet sets are found on display at extremely low prices, that in most cases are 50 per cent cheaper than similar articles of American manufacture.

Price being the main consederation for the average Peruvian buyer of toilet goods, no great attention is paid to the superior quality of the American products, with the consequent limited demand for the latter as reported by dealers importing such goods from the United States.

In order to extend their trade in toilet articles in Peru, Japanese exporters have lately appointed a number of manufacturers' representatives to handle their lines. Aside from these agents who sell to the Peruvian importers of such goods, toilet articles are imported by several Japanese firms which resell to the small shops.

Modern Methods of Celluloid Manufacture

In this concluding article are described the more recent mechanical advances

By Evarts G. Loomis
Consulting Engineer, Newark, N. J.

The processes of manufacturing celluloid as worked out by the originator of this material, John Wesley Hyatt were, while efficient considering the time in which they were invented, insufficient for the demands of modern industry. The improvements recently made in colloiding the cellulose nitrate and in filtering the celluloid were described in October Plastics. Other advances made in this art are taken up in the present article.

A further improvement introduced at Arlington about twelve years ago to reduce the trouble and loss due to dust getting in the material during manufacture, was the equipping of various buildings with air washer ventilating systems and closing all the windows and other free openings.

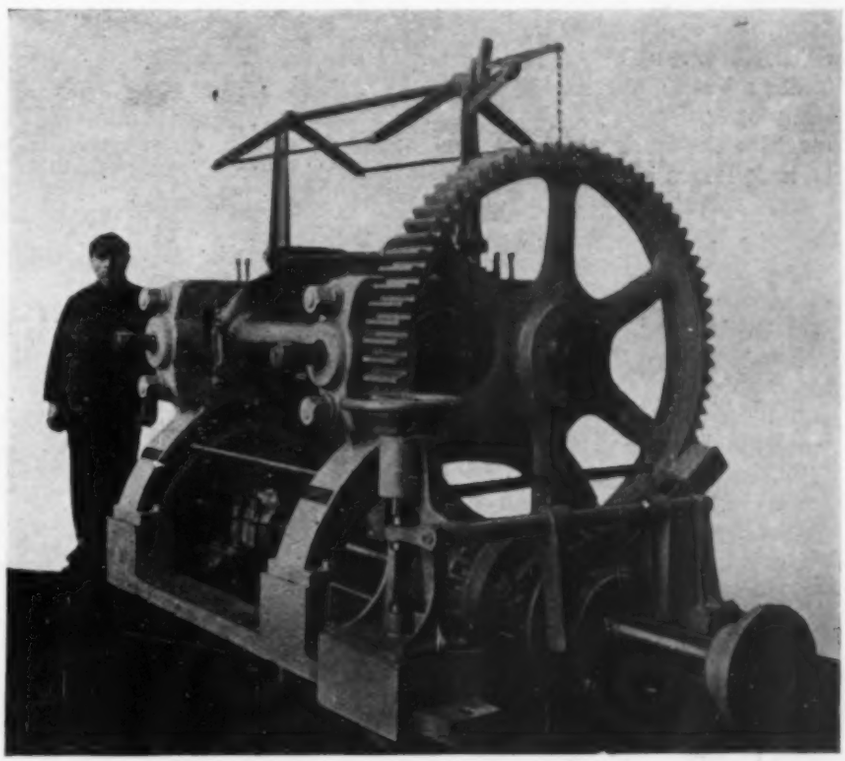
The Farrel Rolls used by most the manufacturers were originally identical with rubber mills except that the connecting gears on the two rolls were of the same number of teeth for the reason that "friction" cannot be used on celluloid as on rubber on account of the danger of fire and also the formation of iron dust by the rolls grinding together.

Keeping Out Dirt

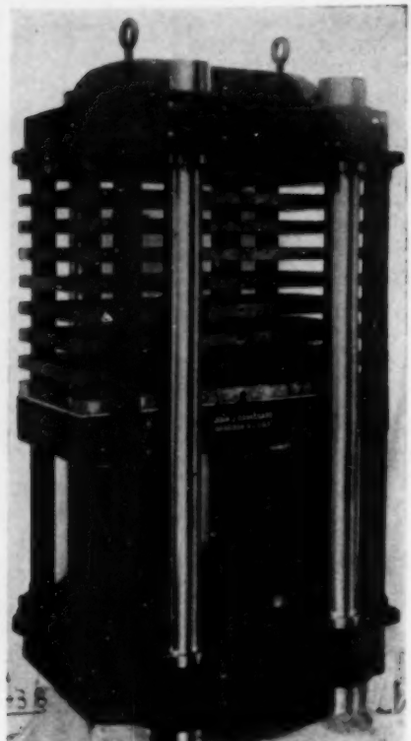
The great difficulty on these rolls was the getting of grease and dirt into the stock from the bearings and other parts. The writer in collaboration with the Farrel Foundry & Machine Co., deigned a construction for positively overcoming this trouble which was adopted by the Arlington Company on all their new machines.

Also another great improvement in these machines made in recent years by the Farrel Foundry & Machine Company, is the coil clutch and brake. In most installation of these rolls they are arranged in groups driven by one motor. This tends towards economy in floor space, in maintenance, in power consumption and in first cost. The old style jaw clutches used to throw the machines in and out of operation, were very unsatisfactory. They entailed serious shocks on the machines, on the gearing, drives and on the motors, which resulted in frequent breakdowns and a very great many repairs and much maintenance expense. Furthermore, they have been condemned by the state labor boards of many states as unsafe owing to the many accidents which occur on rolls equipped with them. Most of the leading celluloid manufacturers have equipped all their rolls with these coil clutches as a result of the very satisfactory results they give. They throw the load on the motors gradually, quietly and without shock and when tripped in case of an accident they release and allow the rolls to stop instantaneously. Where they are used they have practically done away with accidents.

Another machine designed by the writer as an adjunct to the roll room, was the guillotine cutter which is now found in almost every celluloid plant. In the early days the masses of material after leaving the rolls, soaking tubs or later the vacuum



Modern Celluloid Rolls with gear guards removed.



Polishing Press.

mixers, were cut up by men using heavy butchers' knives into sizes that could be fed to the rolls. This entailed a great deal of hard labor and delay. In the guillotine cutter which is built by John J. Cavagnaro the material is placed on a monel covered table arranged to be moved under a heavy, vertical, hydraulically operated blade. With this machine the work which formerly took hours can be done in as many minutes. According to records taken at Arlington one of these machines increased the production of a roll room about thirty percent.

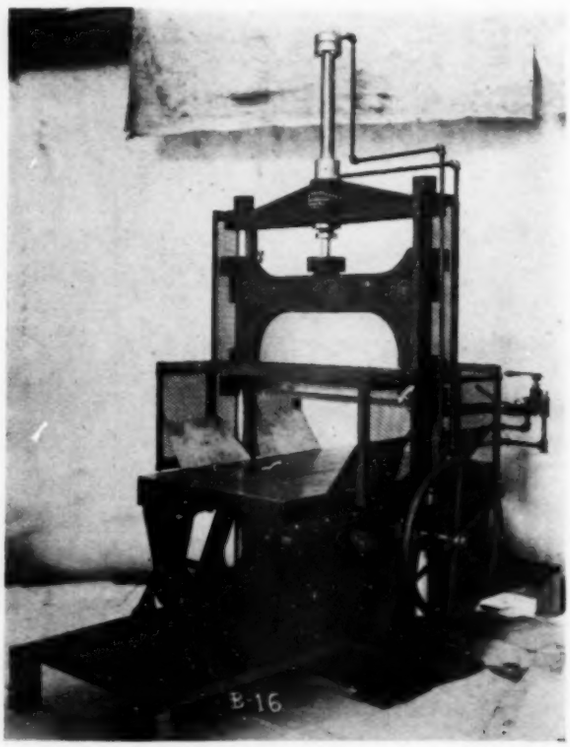
The presses used for polishing sheet material were formerly equipped entirely with cast iron platens from 3" to 3½" thick having cored passages for steam and water circulation. These platens on account of their great weight and the irregularities which were bound to occur in the coring, were slow and varied greatly in their heating and cooling, so that it was very difficult to obtain uniformity in their results. Also their passageways would frequently choke up and also the plates would crack so that it was quite an expensive item to maintain them. The writer did a considerable amount of experimental work in trying to produce an improved platen. Various built up platens of steel plates rivetted and welded together had been made, but none of them have proved really successful for the heavy duty required in a celluloid polishing press. Finally about the year 1914 it occurred to the writer to try drilling the circulation holes in a solid steel plate and the problem was put up to John J. Cavagnaro who after a little experimentation turned out what, as far as we can learn, was the first drilled solid steel press platen. This type of platen on account of its greater speed and uniformity in heating and cooling, and its far greater durability has replaced the cast iron platens in the larger celluloid plants and also is coming into rapid use in the rubber and other similar fields.

During the early period of the war owing to the interruption to importations there was great difficulty in obtaining certain chemicals, and urea, which was largely used in this country as a stabilizing agent for celluloid, was soon almost impossible to procure. At this time Mr. Crane adapted the boiling or poaching process, which had been in use for stabilization in the manufacture of smokeless powder to the treatment of pyroxylin for celluloid with great success, and this has now become the regular practice in most the plants with greatly improved dependability of the product.

Since the DuPont Company acquired the Arlington plant in 1916, they have introduced and developed a number of notable improvements in manufacturing methods. One of the most important is the blending barrel, in which a day's run of pyroxylin is thoroughly mixed together and a uniformity of product is thus obtained which is of evident great advantage.

Also the method of soaking scrap in tumbling barrels is a wonderful improvement over the crude old tub method heretofore used in most of the plants in this country.

In conclusion the writer wishes to say that this article



Guillotine Cutter.

is not intended to be in any way exhaustive or to cover more than certain of the major improvements, mostly mechanical, in the development of the celluloid manufacturing industry, with which the writer is familiar as a result of his eighteen years experience in this field.

Owing to the policy of secrecy maintained by most of the various manufacturers in this industry up to recent times he has been unable to do justice to many improvements which undoubtedly have been made in the processes and equipment of other plants, but hopes that with the new tendency towards friendly cooperation and sharing of information, experiences, and discoveries for the mutual advantage, other writers will be induced to round out the story of the development of celluloid manufacture which he feels he has so inadequately outlined in this brief sketch.

—o—

A new line of hair dressing accessories has been developed by the Stay-tight Company, represented by H. Charles Laufe at 303 Fourth Avenue, New York City.

Among the main items is a line of two-way tooth water combs, which is to be distributed through both beauty shops and department stores.

The new beauty salon of the H. & S. Pogue Company of Cincinatti is now in charge of Miss N. Hankey.

The salon, which is on the sixth floor, contains an interesting section devoted to the sales of toilet goods.

Leschin, Inc., of Chicago, Ill., has installed a high grade toilet ware department.

In an early issue:

"What We Don't Know About Amber"

By Irving L. Goldberg
American Celutex Corp.

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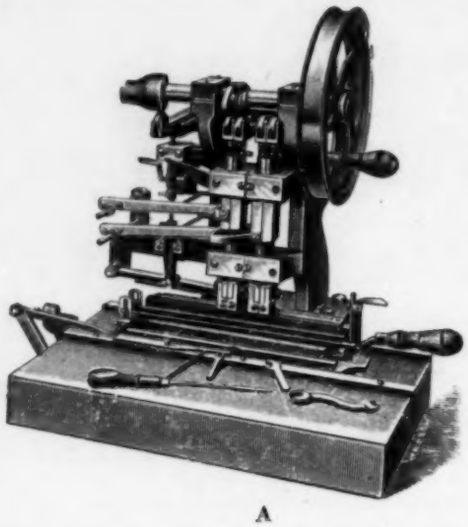

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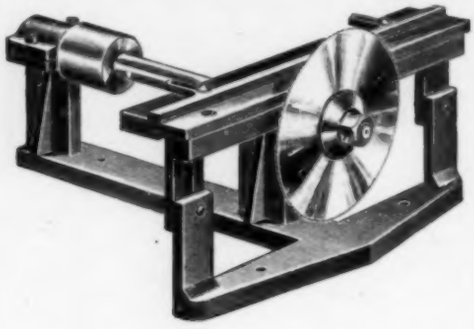


B

A—Double Split Mandrel cutting machine for cutting teeth in dressing combs.

B—Shaping saw machine for sawing horn stock into strips.

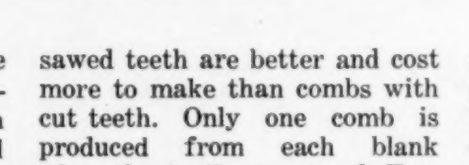
The Fabrication of Dressing Combs

The cutting and shaping of horn stock incidental to the manufacture of combs

By L. B. Kavanagh

President, Standard Tool Co., Leominster, Mass.

IN making dressing combs the pressed horn plates are sawed into strips of proper width on a shaping saw machine and the ends of these strips are sawed off to proper lengths on a squaring saw machine. The pieces are next run through a horn planer to reduce them to an even thickness, after which they should be seasoned by remaniing in a warm, dry room for about ninety days while packed in trays to keep them straight. If kept in a steam heated dry house while screwed in trays or racks with flat strips of metal separating each piece, they will season in a much shorter time, but the longest process is considered the best. After the horn blanks are seasoned, the next process is to make the comb teeth which may be sawed in dressing comb sawing machines or cut in a double split mandrel cutting machine. Combs with sawed teeth are better and cost more to make than combs with cut teeth. Only one comb is produced from each blank when the teeth are sawed. Two combs are produced from each blank when the teeth are cut and have their teeth dovetailed into each other when taken out of a Double Split Mandrel Cutting Machine. Immediately before the teeth are cut in the horn blanks they are heated in a set of block heaters, and the base of the cutting machine should also be heated by steam so that the blanks will not get chilled but remain soft and pliable until the teeth have all been cut in the comb. Teeth in any length of comb up to nine inches can be cut in the Machine. One pair of racks and two pairs of cutters are required to cut teeth in a dressing comb, and to cut another comb having longer or coarser teeth additional racks and cutters to correspond.



Comb blank after cutting.

The machine may be run entirely by hand, or if a counter shaft for cutting machine is installed, partly by hand and partly by power. The usual method being to turn the wheel while cutting the large or guard teeth at the end of the comb with the right hand, at the same time swinging the mandrels and throwing the drag a trifle by means of the levers on the left side of the machine with the left hand, then shifting to power while cutting the

coarse teeth in the first half of the comb. Then after sliding the cam shaft with the hand and throwing the drag by means of a foot treadle into proper position, the fine teeth in the other half of the comb are cut with the other pair of cutters in the other pair of mandrels, after which the guard or end teeth in the other end of the comb are obtained while turning the wheel by hand as at the beginning. The whole process takes about one-half minute. Each cutter cuts but one side of a comb tooth at a time. They rise and fall alternately as the comb passes along underneath.

Stripping the Comb

A comb having but one size teeth its whole length can be cut with one pair of cutters by using a long rack in place of the pair of short racks. The cutters or chisels which cut the teeth are held in jaws in the lower ends of the mandrels, and by means of adjusting screws in the jaws, the angle at which the cutters are held may be varied so as to cut the teeth to the proper taper. The cutters must be sharpened to a cutting edge with small oilstones by the operator of the machine.

There must be a flat piece about 5/8" thick on top of the drag underneath the comb plate that the cutters will strike against without injury. This foundation piece may be of tin which can be easily resurfaced, or a flat piece of iron with the top covered by a piece of fibre board that is easily replaced as often as necessary.

Immediaely after the teeth are cut the combs should be stripped apart and then driven together again with a driver and then while still hot, put into a straightening press to keep the combs from warping before they cool off.

If the teeth in the blanks are to be sawed, the horn blanks may be placed in cold water for a few hours and then in warm water for a few minutes just be-

(*Continued on page 102*)

For every operating condition there are standard H-P-M Pumps & Accumulators

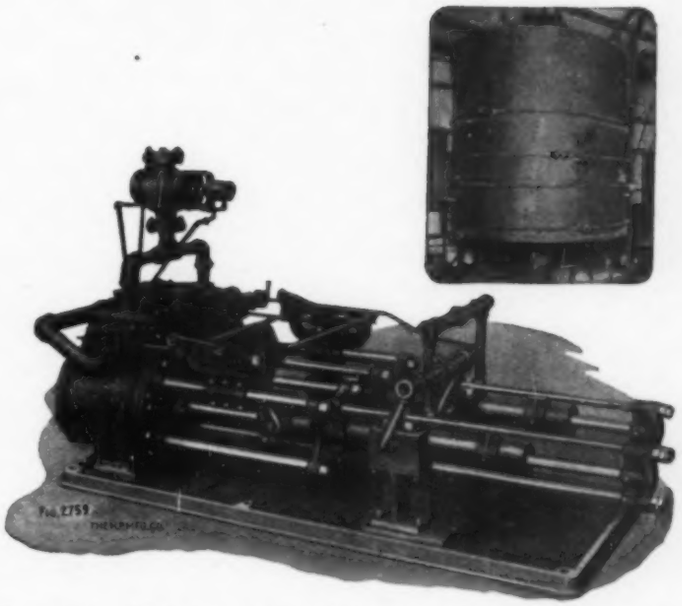


Fig. 2759—H-P-M driven high pressure hydraulic pump. Duplex Steam pump with special H-P-M Control.

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TECHNICAL ABSTRACTS
AND PATENT REVIEW

PREPARATION OF MIXED CELLULOSE ESTERS. Societe de Stearinerie et Savonnerie de Lyon. French Patent 581160, July 31, 1923.

Mono-or di-esters of cellulose with mineral acids (such as nitric acid); (cellulose mono or di-nitrate), or cellulose diacetate or the like, are mixed, in the presence of pyridine and while in solution in a suitable hydrocarbon, with a calculated amount of the chloride of one of the higher fatty acids, as for example, with the chloride of lauric acid. By precipitating with alcohol, the new mixed cellulose esters can be obtained as translucent films. The products have greater tensile strength than the esters of cellulose containing only higher fatty acid residues, and are especially valuable due to their solubility in cheap solvents such as benzol.

MECHANICAL PENCIL OF BAKELITE OR REDMANOL. U. S. P. 1,552,123, Sept. 1, 1925. F. C. Deli, assignor to the Autopoint Co., Chicago, Ill.

Constructional details of the propelling mechanism and a process for molding the pencil from phenol-aldehyde condensation products such as Bakelite or Redmanol. The method of molding is broadly claimed in a copending patent application to which reference is directed, Kaufman, Lvnn and Deli, Serial 612617, Jan. 15, 1925. 4 claims.

ACETANILID AND UREA AS PLASTICIZERS OF CELLULOSE NITRATE. Katsumoto Atsuki, Journal of the Faculty of Engineering, Toyko Imperial University, 1925, 15, 291-302.

The plasticizing power of the above substances is markedly less than that of camphor. For example, celluloid cannot be made from cellulose nitrate and acetanilid alone. By substituting some acetanilid for the camphor, the celluloid becomes brittle, although up to five percent of this can be used to advantage as a stabilizer. Urea is a good stabilizer and can be used up to seven percent.

COLORLESS SNYTHETIC RESINS FROM UREA. A. Mittasch, H. Ramstetter and the Badische Anilin —und Sodafabrik. German Patent 409847, June 3, 1922. Class 12-o.

One mol of urea and at least 2.4 mols of formaldehyde are condensed in the presence of a mineral acid at an elevated temperature.

PLASTIC MASS. I. A. S. Blachorovitch, English Patent 229358, 1923.

Sand, mica, metals and alloys, paper, cork, sawdust or the like is mixed with some gypsum and a gelatine solution, and finally with a hardening agent as chrome alum, alkali bichromates, formaldehyde or tannin.

CAMPHOR CONTENT OF PYROXYLIN PLASTICS. Katsumoto Atsuki, Journal of the Faculty of Engineering, Tokyo Imperial University, 1925, 15, 281-290.

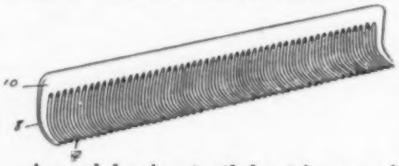
The best percentage of camphor in celluloid has been found to be 20%, as when used in this amount it has the greatest degree of tenacity, elasticity and lustre and is sufficiently plastic for most purposes.

The synthetic camphors usually contain chlorine derivatives, and also exhibit a lower solvent power for cellulose nitrate. Cellulose nitrate solutions in alcoholic synthetic camphor are more viscous than those in natural camphor. In general practice natural camphor is said to yield the better product.

INCREASING THE PLASTICITY OF CELLULOSE ESTERS. C. M. F. Martin, French Patent 573701, Feb. 27, 1923.

0.5 to 3 parts of phenol or cresol are mixed with one part of an aromatic sulfamide, or arylated or alkylated sulfamide, and fused. The melting point of such a mixture lies between 70 and 130° C. 100 parts of a cellulose ester, e. g. cellulose acetate, are mixed with 30 parts of the above plasticizing mixture and heated. The resulting product is a thermoplastic material which can be readily molded.

COMB. U. S. P. 1,551,160, Aug. 25, 1925. Charles Laufe, New York.



A comb having teeth bent in a gradual curve until they are almost at right angles with the back of the comb. The claim reads: "An elongated comb having a back and integral teeth extending therefrom at one side only, said teeth being bent intermediate the extremities thereof in a gradual curve at one side of said comb to form sections disposed substantially perpendicular each to the other with a curved connecting portion therebetween. The object is to permit better use of curling irons.

CELLULOSE - ACETONITRATE. Katsumoto Atsuki, Journal of the Faculty of Engineering, Toyko Imperial University, 1925, 15, 309-316.

Cellulose aceto-nitrate $C_{12}H_{14}O_{10}$—$(CH_3CO)_4$—$(NO_2)_2$ can be easily prepared, at least as far as the degree of acetylation is concerned, by regulating the quantity of sulfuric acid employed.

The substitution of the nitro groups by acetyl groups destroys the solubility of this mixed cellulose ester in camphor-alcohol. The viscosity of solutions in acetone is low. Although the inflammability of the cellulose nitrate is reduced very much by the acetyl groups, the sudden decomposition of the product is not prevented. Films made from cellulose aceto nitrate are brittle.

DURABLE METALLIC DESIGNS ON PYROXYLIN AND SIMILAR PLASTICS. Bernhard van der Laan, German Patent 415823, applied for May 19, 1923; addition to 407213.

Pyroxylin or cellulose acetate sheets are decorated by means of atomization of electrodes (spray process), this being carried out in a vacuum and with cooling of the material to prevent its decomposition. Beautiful silver and gold effects can be secured and the process may be used for the preparation of signs and ornamented articles; a protective layer of lacquer serving to prevent tarnishing.

NON-INFLAMMABLE CELLULOID. Wm. G. Lindsay, assignor to the Celluloid Co., Newark, N. J. U. S. Pat. 1538859, May 19, 1925.

Pyroxylin is mixed with aluminum phosphate, with or without solvents, and formed as usual. Methanol or acetone may be used, and such plasticizers as tricresyl phosphate can be added.

POROUS PYROXYLIN PLASTIC MATERIALS. K. Hansen. English Patent 228844, Feb. 9, 1924.

Porous filters, battery separators or the like may be made by adding to a heavy semi-fluid mass of celluloid some powder such as zinc, magnesium or calcium carbonate or similar acid-soluble material. The material is then shaped as usual, and the powder dissolved out of the mass by treatment with an acid such as hydrochloric acid.

RECENT BOOKS

Synthetic Resins and their Plastics
Carleton Ellis
1923. The Chemical Catalog Co.

SINCE the advent of the synthetic resins, the literature on this subject has been scattered through a large number of publications, many of them in language other than English, and the art in general has found expression in numerous patents. No comprehensive survey of this field, written both from the point of view of the chemist as well as the practical user was extant until the appearance of the present comprehensive volume.

In gathering the existing information on the many types of synthetic resins, Carleton Ellis has done the industry a great service. In the 461 pages of text there is related a great deal of interesting information, much of which will be new to many readers; especially such as have not had the opportunity of following the developments of the new art of resin synthesis. To give, within the compass of a few columns , an adequate outline of the many points covered by the author is well-nigh an impossibility. Ellis has taken the various synthetic resins and has grouped them according to their chemical characteristics and derivation.

After an initial review covering synthetic resins in general, and their diverse application, this volume contains a detailed account of the cumarone and indene resins; their preparation and properties, and their uses. This covers the first four chapters.

In each case the history of the resin is traced, and the most approved methods for its application, as well as testing is given. From the viewpoint of thermoplastic compositions, the cumarone resins are, obviously, not as important as the resins covered in the next chapters, as they are not capable of induration by heat and pressure.

The fifth chapter deals with a class of resins that has as yet not become widely known, covering the resins derived from petroleum hydrocarbons, and resulting from polymerization and condensation processes.

The importance of the phenol-aldehyde condensation products is well brought out by the amount of space devoted to this type, being from chapter 6 to 9, almost a hundred pages, all replete with accurate and interesting matter. Users of this type of product will find much valuable information here, and students of the history and development of the phenol resins can find here the records of the achievements of all discoverers and inventors who have worked so assiduously in this difficult field.

Chapter 10 deals extensively with the aldehyde resins, some of which are undoubtedly destined to some day play an important place in this ramified industry, although many of the products employed in their formation

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are at present too expensive to find practical application.

The furfural resins, which have lately become better known and give much promise of wide application due to the recent cheapening of furfural by its preparation from corn cobs and oat-meal hulls, are fully treated of in Chapter 11. The chemical history of the ketone resins or acetone resins comprise the twelfth chapter.

The many possibilities presented by the condensation products of urea and formaldehyde, and thiourea resins are fully discussed in the thirteenth chapter, while the various wood, resin and ester gum resins take up the next three.

Another type of resin that promises to play an important part in future electrical insulating problems is that represented by "Glyptal," the glycerol-phthalic acid condensation product. This is discussed in chapter seventeen. Other complex condensation products, such as the polymerized vinyl compounds, the sulfur resins, nitro resins, halogenized rubber and many more are described in considerable detail further on.

From the Plastic Molders point of view, chapters 24 to 27 present the greater interest, as here are presented for the first time in well coordinated form, the problems of Plastic Molding, including a comprehensive treatment of the question of die-making, design, and testing of the molded products. This portion of the volume is profusely illustrated both by halftone cuts and drawings, and really constitutes a treatise on the subject. Being written in non-technical language it can be read with profit and understanding by every one interested in this fascinating industrial art.

The last chapter, No. 27, is devoted to a discussion of the electrical properties of molded insulation, and tests for its efficiency. This will be most welcome to those who are not so well versed in things electrical as it gives a clear account of the various expression employed by electrical engineers in connection with such materials.

The book is completed by an index of the names of authors and a subject index. In this connection it is to be regretted that the author did not also provide a patent number index, as in very many cases, when looking up a process, only the patent number is known, and the numerous foot-notes throughout the volume refer to a great number of patents, both domestic and foreign. As the book is useful to the technician as well as the chemist, the subject index has evidently been prepared with a view to ease of finding rather than strictly in accordance with the accepted practice when indexing chemical subjects.

We can unhesitatingly say that "Synthetic Resins and Their Plastics" is a highly valuable contribution to the art, and the fact that it is not only intensely interesting but, what is quite rare in technical books, is thoroughly "readable," makes it all the more so. Needless to say, the publishers have also contributed by the excellence of the typograhy and binding.

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Electrically Heated Hydraulic Press

(*Continued from page 82*)

large production, I will give a description of same. The diameter of the main ram is 10 inches, which is located in the back of the press, with stroke to suit the work. The sub-press, at the front of the press has a ram of 3 1-16 inch in diameter, stroke to suit the work. The latter ram is double-acting. The necessity for this is, that it is used for pulling the molds apart, as well as being used for ejecting the finished work from the used is 3,000 pounds per sq. in. making a capacity on the 10 in. ram of 118 tons, and on the sub-press ram a capacity of about 12 tons, but when this latter ram is used for ejecting the work, it is constructed with a toggle arrangement that gives it a capacity of 5 to 1 or about 40 tons. This feature takes the place of the geared arbor press I spoke of above, on which I base my conclusion that this press does the work of three presses and makes the cost of one press less than that of three presses, as well as saving fifty per cent of the labor. The press will take in molds up to 11 in. by 19 in. The shipping weight is 6040 pounds, and is furnished by the manufacturer with either electrically or steam heated hot plates.

Now, in looking at it from all angles, I find that for quality and quantity production, the press has hardly an equal, but in all fairness to the reader, I must tell him what I have discovered about the same. I refer to the above described test on "201-A" Tube Bases, or similar pieces. It will turn out 1400 pieces per hour, which is fine for a large manufacturer who has to make pieces by the million, but the small molding press plant does not get orders in such large quantities, therefore, it has been found that this press is too large and must be cut down in size but not in capacity in tons, so that the small jobbing molding plant can use it to its advantage, which I understand is being considered by the inventor.

—o—

Precautions in Handling Pyroxylin Materials

(*Continued from page 84*)

A gate, hung by a fusible link which would shut off the air current through the fan is essential. Its construction to open a by-pass around the fan would allow exit of flame or gases to the outer air.

The point of discharge from any exhaust system, removing celluloid refuse should be located at a point where no incandescent material from chimneys may come in contact with the discharged air from the system or dust collector.

If these precautions are taken when installing devices to shape, cut, grind and buff articles of celluloid, the fire hazard may be greatly minimized.

Pursuant to the provisions of the Labor Law it is necessary to file plans for approval with the Department of Labor before installing exhaust systems.

—o—

The Fabrication of Dressing Combs

(*Continued from page 97*)

fore sawing the teeth, so that the saw will be less liable to chip the horn.

The Dressing Comb Sawing machines are used in pairs. The operator puts the comb blank into the clamp of the machine and starts it. The clamp swings forward and back as each tooth is sawed and feeds along and stops automatically when the coarse teeth are sawed in one end of the blank. The clamp with the blank still in it is then taken out and placed in the other sawing machine and the fine teeth in the other end of the blank sawed in a similar manner, the clamps in the machines being interchangeable. The line to which the saw will cut, and the length of the teeth may be varied by altering the shape of the gauge on the front side of the machines. If

teeth of one size only are desired in the blank they can be sawed in a single machine for a comb of any length up to nine inches. The racks and cams in the machines which determine the coarseness of the teeth can be easily removed and replaced by those of a different pitch. One operator can tend several machines and they are usually set up in a row on a long bench.

Pollopas-Organic Glass Substitutes

(*Continued from page 85*)

centimeter thick and with a surface of one square centimeter with a difference in temperature of 1 degree C., is only 0.00184, being between that of porcelain and crown glass.

Thus far the Pollopas articles which have been offered to the trade have not shown very great electrical insulating properties, but this phase of the subject is being studied further.

Pollopas is highly resistant to water, and such solvents as alcohol and the like. The maximum water absorption on immersion for 24 hours is only 0.1 to 0.2 percent. Due to the slight superficial effect of solutions of caustic soda on Pollopas, it becomes possible to color the surface of the same by means of suitable dyes, and then to form designs upon the surface by scratching away some of the dye to expose the uncolored surface.

Pollopas does not melt on heating to 200 degrees C. It does not lose its transparency and colorlessness on exposure to light, and the high polish which can be obtained on it greatly exceeds that possible with the phenol resins.

As to its commercial applications, it is evident that while it does not as yet meet every possible requirement, it will find immediate use in the manufacture of smokers' articles, imitation jewels, and especially for goggles, lenses and the like. It is also an excellent substitute for

In January Plastics:
"The Story of Karolith"
By George H. Brother

FJS FJS

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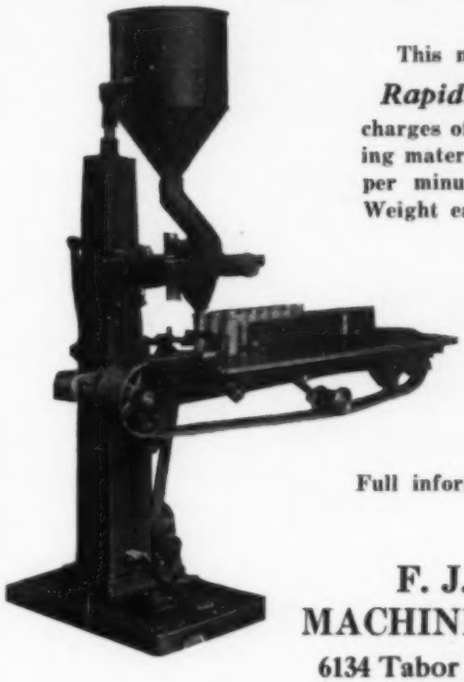

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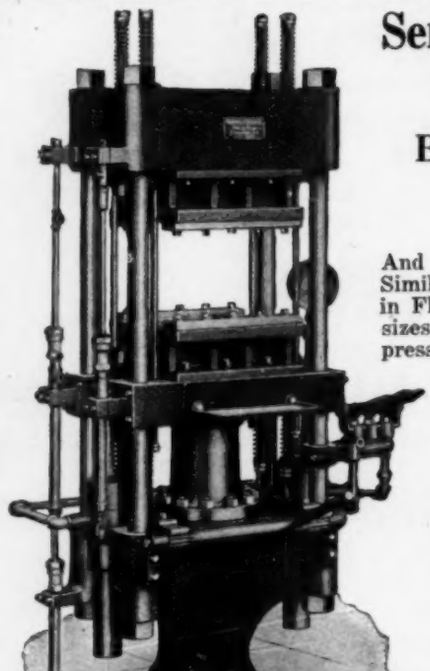

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porcelain as it can be made to closely resemble it. One of the greatest possible advantages is that it does not splinter when broken, as does glass, and its complete transparency makes it a possible competitor for this material for such purposes as windshields.

Pollopas can be etched by means of hydrofluoric acid or concentrated sulfuric acid. Its use in the preparation of triplex, non-shatterable glass, as celluloid is now sometimes used, is indicated, as the hard surface of the glass would prevent the scratching of the softer Pollopas.

One of the outstanding properties of Pollopas is its capability of transmitting ultraviolet light, which glass absorbs. For example, Pollopas might be advantageously employed for windows of hospitals where it is desired to give patients, such as tuberculosis victims, the great benefits of direct sunlight baths without subjecting them to the outdoor temperature. For hothouse roofing, where it has been shown that the ultra-violet light plays an important part in plant growth, Pollopas may find useful application.

Shaping Pyroxylin

Pyroxylin plastics can be stamped and shaped by simply using heated dies, provided that the sheets are thin enough. Heavier masses are first softened in hot water at 150° Fahrenheit, and then formed with a hot die. Solvents are not only not required but would be useless for the purpose.

B. Forman of Rochester, N. Y. has recently added to its staff, in the position of toilet goods buyer, Miss Anna McGwin, formerly of Robert Fraser, Inc., Utica, N. Y.

E. S. Woodman has recently been placed in charge of the toilet ware department of Houghton & Dutton Co., Boston.

Decorating Pyroxylin

(*Continued from page 89*)

a suitable solvent, and the two are pressed against the aforesaid glass plate. This unites the two sheets forming an opaque product, with the design showing in red and matte-red on the back of the card. A third, white, sheet of plastic is then combined with the other two in the same manner.

A sheet of the transfer paper bearing the design for the face of the card (in reverse) is applied to the white surface and is then impressed therein by pressure, after moistening the pyroxylin sheet with a solvent, after which the transfer paper is lifted off, leaving the design in clear cut outline and color in the white background. A thin, transparent sheet of plastic is finally applied over the face of the card and the whole complex thoroughly pressed to weld the same into one piece, thus completing the card.

The results are striking and clean-cut. Obviously, when carried out on a regular production scale, this process is much more rapid than would be supposed, as by using large sheets and running 52 cards up a whole deck can be prepared at one time, to be cut into individual cards afterwards. The process is protected by German Patent 405628, applied for October 12th, 1922.

A Poor Name

(*Continued from page 81*)

least, always signifies something "not-as-good-as-the-real-stuff."

Why not adopt a similar general name for *all* the plastic materials that have their origin in the *cellulose molecule*, be they ethers or esters of cellulose.

The active expression of opinion on this vital subject is invited. Send in your suggestions and let the combined "Pyroxylin" industries adopt either this or something better so that the cumbersome term "Pyroxylin plastic material" may be duly interred with the rest of the relics of the glorious past.

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